invited the commission to hold its next triennial meeting at Monaco April 1 of this year. It is proposed to hold the sessions in the rooms of the Oceanographic Museum. The last meeting was held at Milan in 1906.

This commission suffers under a somewhat misleading name, as it is not especially concerned with aeronautics—i. e., the navigation of the air—but has for its sphere the whole subject of upper air meteorology. Inasmuch as the term "aerology" is now quite generally applied to this branch of meteorology, the writer of these notes ventures to suggest that the commission ought to be renamed "International Aerological Commission;" especially as there exists another international organization for the discussion of purely aeronautical questions; viz, the Commission Permanente Internationale d'Aéronautique.

This commission—i. e., the one devoted to "aerology"—has a membership of 55, and is the largest of all the commissions on special subjects appointed by the International Meteorological Committee. Its president is Prof. H. Hergesell, director of the Meteorological Service of Alsace-Lorraine.

INTERNATIONAL COMMISSION ON DAILY WEATHER REPORTS FOR THE GLOBE.

Another meteorological commission is to meet at Monaco in April; viz, the commission appointed at the last Paris meeting of the International Meteorological Committee to consider Teisserenc de Bort's plan of securing prompt reports, day by day, from about 30 selected stations in various parts of the globe, and the suggestion of Hildebrandsson that observatories be established at the "centers of action" of the atmosphere. This commission will begin its sessions just after those of the Commission on Scientific Aeronautics, viz, April 5, 1909. The adoption of the project of MM. Teisserenc de Bort and Hildebrandsson would enable the central office of each national weather service to keep *en rapport* with current meteorological conditions in other parts of the globe, and especially in those regions where the phenomena of the atmospheric circulation are believed to be of the greatest significance to the weather of the world at large. So far as the Weather Bureau is concerned, it would facilitate the enlargement and improvement of our synoptic weather map of the Northern Hemisphere, now made every day at Washington from telegraphic reports.

The members of this commission are: Teisserenc de Bort (president), Hildebrandsson (secretary), Hergesell, Deslandres, Hellmann, Lyons, Shaw, and Walker.

METEOROLOGICAL APPOINTMENT IN BELGIUM.

It is announced that J. Vincent has been appointed director of the meteorological service of the Royal Observatory of Belgium—i. e., of the Belgian national weather service—to succeed the late Albert Lancaster. M. Vincent has been prominently connected with the Belgian service for many years, and has been director *ad interim* since the death of M. Lancaster; hence his appointment to the directorship was in the natural order of events.

A COURSE IN METEOROLOGY FOR BALLOONISTS.

A five-hour course in meteorology for balloonists and others interested in aeronautics, covering the months of January and February, has been established at Cologne under the auspices of the aeronautical club of that city. The lectures are given at the Handelhochschule, by Doctor Polis, director of the meteorological observatory of Aix-la-Chapelle.

HOMAGE TO PROFESSOR HANN.

Meteorologists all over the world unite this year in doing honor to Hofrat Prof. Dr. Julius Hann, of Vienna, who completes his 70th year on March 23. At the instance of Prof. Wilhelm Trabert, the photographs of prominent meteorologists of all countries have been collected at Vienna, and will be presented to Professor Hann on his birthday.

DR. PAUL BERGHOLZ, 1845-1909.

Dr. Paul Bergholz, director of the meteorological observatory at Bremen, died January 3, 1909. Doctor Bergholz took charge of the second-order station at Bremen in 1889, caused it to be raised to the rank of an observatory the following year, and thereafter, up to the time of his death, carried on the observations that have been published in such elaborate detail as a separate annual volume, for Bremen, of the "Deutsches meteorologisches Jahrbuch." He also collected and published several early series of observations at Bremen, extending back to the year 1803.

Other publications by Doctor Bergholz related to tropical hurricanes, including a substantial volume, "Die Orkane des ferne Ostens" ("The hurricanes of the far east"), based on the first edition of Algué's well-known treatise on that subject.

OFFICERS OF THE ROYAL METEOROLOGICAL SOCIETY FOR 1909.

At the annual meeting of the Royal Meteorological Society on January 20, the following officers and members of the council were elected for the ensuing year:

President, Lieut.-Col. H. Mellish; Vice-Presidents, Mr. W. W. Bryant, Mr. W. H. Dines, F. R. S., Commander M. W. Campbell Hepworth, C. B., Dr. H. R. Mill; treasurer, Dr. C. Theodore Williams; secretaries, Mr. F. C. Bayard, Commander W. F. Caborne, C. B.; foreign secretary, Dr. R. H. Scott, F. R. S.; council, Messrs. R. Bentley, F. J. Brodie, C. J. P. Cave, Dr. H. N. Dickson, F. Druce, E. Gold, R. Inwards, B. Latham, R. G. K. Lempfert, Col. H. E. Rawson, C. B., Capt. R. C. Warden, and Capt. D. Wilson-Barker.

AEROLOGICAL STATIONS OF THE WORLD.

The Wiener Luftschiffer Zeitung for February 1, 1909, publishes a complete list of the upper air observations made on the "international days" during the first half of the year 1908. From this list we learn that observations with kites or balloons (or both) were made more or less regularly at the following places:

Trappes, France; Uccle, Belgium; DeBilt (near Utrecht), Holland; Pyrton Hill, Petersfield, Brighton, Glossop (near Manchester), England; Pavia, Italy; Guadalajara, Spain; Zürich, Switzerland; Strassburg, Frankfort a M., Hamburg, Lindenberg, Munich, Friedrichshafen (the kite station on Lake Constance), Germany; Vienna, Austria; Pavlovsk, Kasan, Koutchino, Ekaterinburg, Nijni Olchedaev, Tiflis, Baku, Kovno, Russia; Helwan, Egypt; Blue Hill (Mass.), Mount Weather (Va.), United States.

The above is not a complete list of the aerological stations of the world, but will convey some idea of the extensive scale upon which the campaign of upper air research is now being conducted.

SUMMER AND WINTER VERTICAL TEMPERATURE GRADIENTS.

By W. J. HUMPHREYS, Professor of Meteorological Physics.
Dated Mount Weather, February, 1909.

In my article on the vertical temperature gradients of the atmosphere, Vol. II, No. 1, of the Mount Weather Bulletin, I state that the effect of change of season on this gradient causes it to be greatest in winter and least during the summer, and that this condition is best seen at a considerable elevation, since in the turbulent region next the earth storms and other temporary results mask those due to seasonal change.

The gradients of the lower atmosphere are so frequently at variance with the above statement in regard to the seasonal changes that it seems desirable to test it by a large number of direct observations. I have, therefore, brought together in Table 1 all the published summer and winter gradients between 3,000 and 8,000 meters elevation obtained since 1904 with sounding balloons at five different stations.

The 3,000-meter level is just above the lower turbulent region, in which to measure the temperature gradient is akin

to measuring the flow of a river by putting the float in an eddy near the shore, while the 8,000-meter level is safely below the upper inversion. It is in this region of comparatively uniform changes that seasonal effects are most clearly seen.

TABLE 1.—*Observed vertical temperature gradients between 3,000 and 8,000 meters elevation.*

LINDENBERG.

Date.	Elevation.	Temperature.	$\frac{\Delta t}{100\text{ m.}}$	Date.	Elevation.	Temperature.	$\frac{\Delta t}{100\text{ m.}}$
	Meters.	°C.			*Meters.*	°C.	
Aug. 3, 1905	3,514	— 7.0	0.798	July 5, 1906	3,000	1.3	0.724
	7,652	—40.0			8,000	—34.9	
Aug. 29, 1905	3,000	— 2.4	0.842	Aug. 2, 1906	3,070	2.0	0.817
	8,000	—44.5			7,810	—36.7	
Aug. 31, 1905	3,000	— 1.0	0.524	Sept. 6, 1906	2,870	3.2	0.572
	8,000	—27.2			8,380	—28.4	
Jan. 4, 1906	3,000	— 4.8	0.738	Feb. 7, 1907	3,000	—14.2	0.880
	8,000	—41.7			8,000	—58.2	
Feb. 1, 1906	3,000	— 9.6	0.656	July 4, 1907	3,000	1.4	0.560
	8,000	—42.4			8,000	—26.6	
July 4, 1906	3,022	0.3	0.746				
	7,782	—35.3					

PAVLOVSK.

Feb. 9, 1905	2,280	—17.8	0.642	Feb. 1, 1906	3,000	—22.1	(0.358)
	8,000	—50.0			7,960	—32.7	
July 6, 1905	3,000	0.9	0.636	July 5, 1906	3,000	2.3	(0.497)
	8,000	—30.9			5,820	—11.7	
Aug. 29, 1905	3,000	— 4.4	0.626	Sept. 6, 1906	3,060	— 3.6	0.662
	8,000	—35.7			8,000	—36.3	
Aug. 30, 1905	3,000	— 4.0	0.576	Jan. 14, 1907	3,000	—21.0	0.670
	8,000	—32.8			7,800	—47.8	
Jan. 4, 1906	2,970	— 8.3	0.662	Feb. 7, 1907	3,000	—12.6	0.738
	8,000	—41.6			8,000	—49.5	
Mar. 1, 1906	3,000	—16.7	0.716	Mar. 7, 1907	3,000	—15.5	0.575
	8,000	—52.5			8,020	—44.3	

STRASSBURG.

	Meters.	° C.			*Meters.*	° C.	
Jan. 5, 1905	3,000	— 4.2	0.744	Mar. 1, 1906	3,000	—12.4	0.655
	8,000	—41.4			7,000	—38.6	
Mar. 2, 1905	3,000	—14.0	0.746	July 4, 1906	3,000	2.2	0.668
	8,000	—51.3			7,000	—24.5	
July 6, 1905	3,000	0.1	0.636	July 5, 1906	3,000	2.6	0.642
	8,000	—31.7			8,000	—29.6	
Aug. 3, 1905	3,000	8.2	0.546	July 6, 1906	3,000	— 1.9	0.576
	8,000	—19.1			3,000	—30.7	
Aug. 29, 1905	3,000	— 4.7	0.660	Aug. 2, 1906	3,000	8.0	0.666
	8,000	—37.7			8,000	—25.3	
Aug. 30, 1905	3,000	— 4.3	0.642	Sept. 6, 1906	3,000	3.7	0.603
	8,000	—36.4			8,000	—27.9	
Aug. 31, 1905	3,000	— 2.8	0.618	Jan. 4, 1907	3,000	— 5.1	0.666
	8,000	—33.7			8,000	—38.4	
Jan. 4, 1906	3,000	— 8.5	0.696	Feb. 7, 1907	3,000	—11.4	0.800
	8,000	—43.3			8,000	—51.4	
Feb. 1, 1906	3,000	— 8.4	0.656	Mar. 7, 1907	3,000	—13.4	0.676
	8,000	—41.2			8,000	—47.2	

TRAPPES.

Jan. 5, 1905	3,000	— 7.8	0.756	Mar. 1, 1906	3,000	— 8.3	0.852
	8,000	—45.6			7,000	—42.4	
Mar. 2, 1905	3,000	—17.0	0.850	July 4, 1906	3,000	— 0.2	0.603
	7,000	—51.0			8,000	—31.7	
July 6, 1905	3,000	0.6	0.564	July 5, 1906	3,000	3.2	0.602
	8,000	—27.6			8,000	—27.8	
Aug. 3, 1905	3,000	3.7	0.573	Aug. 2, 1906	3,000	11.7	0.603
	7,800	—28.7			8,000	—19.9	
Aug. 29, 1905	3,000	— 5.6	0.736	Sept. 6, 1906	3,000	0.4	0.578
	8,000	—42.4			8,000	—28.5	
Aug. 30, 1905	3,000	— 1.1	0.810	Jan. 4, 1907	3,000	— 3.2	0.772
	8,000	—41.6			8,000	—41.8	
Aug. 31, 1905	3,000	— 4.4	0.736	Feb. 7, 1007	3,000	—14.6	0.866
	7,540	—37.8			8,000	—57.9	
Jan. 4, 1906	3,000	— 5.7	0.736	July 4, 1907	3,000	— 5.5	0.570
	7,850	—41.4			8,000	—34.0	
Feb. 1, 1906	3,090	— 4.1	0.594				
	8,000	—33.8					

UCCLE.

July 5, 1906	3,490	— 4.0	.795	Sept. 5, 1907	3,492	0.8	.588
	8,460	—43.5			9,050	—31.9	
Aug. 2, 1906	2,900	10.1	.683	Jan. 3, 1908	2,627	— 9.7	.720
	8,240	—26.4			8,375	—51.1	
Jan. 14, 1907	2,990	— 4.5	.647	Feb. 6, 1908	3,000	— 4.0	.698
	8,550	—40.5			8,000	—38.9	
Feb. 7, 1907	2,970	—11.4	.732	Mar. 5, 1908	3,000	—19.0	.917
	7,740	—46.3			7,000	—55.7	
Mar. 7, 1907	2,960	— 7.2	.756	July 29, 1908	3,000	3.0	.600
	8,330	—47.8			7,700	—25.2	
July 24, 1997	3,428	2.2	.654	July 30, 1908	3,000	2.3	.626
	8,854	—33.3			8,000	—29.0	
July 25, 1907	3,598	3.2	.664	Sept. 3, 1908	3,000	—10.6	.630
	8,856	—31.7			8,000	—42.1	

TABLE 2.—*Average vertical temperature gradients between 3,000 and 8,000 meters elevation,* $\frac{\Delta t}{100\text{ m.}}$

Place.	Summer.	Winter.
Lindenberg	0.699	0.758
Pavlovsk	0.599 (0.625)	0.623 (0.667)
Strassburg	0.626	0.705
Trappes	0.637	0.775
Uccle	0.655	0.745
Average	0.643 (0.648)	0.721 (0.780)

The observations obtained at Uccle are copied from Ciel et Terre, the others from Veröffentlichungen der International Commission für Wissenschaftliche Luftschiffahrt.

The average gradients, exprest in change of temperature in degrees centigrade per hundred meters change in elevation, are given in Table 2. The seventy-two observations upon which they are based are not nearly enough to secure averages free from storm and other irregularities, but probably are sufficient to demonstrate the kind of change in the gradient caused by change of season. As shown by Table 2 the gradient at each of these stations was greater in winter than during the summer, the general average being about 10 to 9.

Two of the gradients found at Pavlovsk were exceptionally low, probably due to unusual local conditions. The numbers inclosed in parentheses give the averages with these exceptional gradients ruled out. The others with them included.

THE FORMATION OF HAIL.

By Dr. J. B. GIBSON. Dated Salisbury, N. C, January 5, 1909.

In the MONTHLY WEATHER REVIEW for January, 1906, 34:30, the Editor has published some observations by Doctor Gibson on the formation of hail, and the following extract from a recent letter presents a slight modification of his earlier views:

It is well known that, as a rule, hail precedes the rain. The general opinion that hailstones have a nucleus of snow I do not believe to be justified. * * * Consider a tumbler of water with all but its central portion turned into crystal ice. This is the natural process in the open air. Before solidification is entirely completed hold the central portion of the glass up at the level of the eye and shake it. A globular mass of unfrozen water and mush ice will be found in the dark central portion. Now let freezing completely solidify the contents of the glass and this central part will be a mass of snow-white striæ radiating in every direction. These streaks are as white as cotton thread. This central white core is what is seen in the hailstone, and is produced by the natural process of freezing the central portion last. I venture to assert that snow will not form at all under conditions such that sleet and hail will be generated readily and abundantly.

THE IMPORTANCE OF SYSTEMATIC OBSERVATION OF PERSISTENT METEOR TRAINS.

By C. C. TROWBRIDGE, D. Sc., Columbia University. Dated September, 1908.

[Reprinted from The Observatory, No. 402, November, 1908.]

The nature of the luminous cloud occasionally seen in the track of large meteors, known as the presistent streak or train, has long been regarded as a mystery by astronomers. Meteors which leave these long-enduring trains are few in comparison to the total number of meteors that are observed, and consequently even experienced observers are sometimes taken unprepared, and fail to record an observation with desired detail. Many trains have been seen, however, which have remained visible from ten to thirty minutes, and definite and authentic facts concerning them have been recorded in numerous cases. The late Prof. H. A. Newton, of Yale University, and Prof. E. E. Barnard, of the Yerkes Observatory, have both published some valuable observations on the drift of trains in the United States, and the late Prof. A. S. Herschel, Mr. W. F. Denning, Mr. T. W. Backhouse, and others have likewise published many important facts relating to presistent trains seen in England. Indeed, a very large part of the progress of meteoric astronomy